CLAIMS

What is claimed is:

1. A method of recording data on an optical disc, the method comprising:

dividing each of a plurality of error correction code (ECC) blocks into a plurality of partitions; and

interleaving the data from the partitions so that each of the ECC blocks is alternately and equally selected to generate a first recording block.

2. The method as claimed in claim 1, further comprising rearranging the first recording block to generate a second recording block.

3. The method as claimed in claim 2, wherein the first recording block is rearranged on a sector basis to generate the second recording block.

4. The method as claimed in claim 1, further comprising:

modulating the first recording block; and

recording the modulated first recording block on the optical disc.

5. The method as claimed in claim 1, wherein the dividing of the ECC blocks comprises:

dividing each of the ECC blocks in a column direction by a predetermined number of bytes into object blocks; and

dividing each of the object blocks in at least one of a row direction and the column direction by the predetermined number of bytes to generate the plurality of partitions.

6. The method as claimed in claim 5, wherein the interleaving comprises interleaving all of the data using a same algorithm.

7. The method as claimed in claim 1, wherein a predetermined number of bytes of the data are extracted and rearranged to generate the first recording block.

8. The method as claimed in claim 1, wherein the dividing of the ECC blocks includes:

obtaining a common divisor d for N1 and N2 wherein a size of the ECC blocks is N1xN2 bytes;

dividing each of the ECC blocks into units of d bytes in a column direction to generate N2/d object blocks; and

dividing each of the object blocks into d portions in the column direction and a row direction to generate d x d of the partitions.

9. A method of recording data on an optical disc, the method comprising:

dividing each of two error correction code (ECC) blocks in row and column directions to generate a plurality of partitions; and

generating a first recording block, the generating comprising interleaving the data from the partitions so that each of the ECC blocks is alternately and equally selected.

10. The method as claimed in claim 9, further comprising rearranging the first recording block to generate a second recording block.

11. The method as claimed in claim 10, wherein the first recording block is rearranged on a sector basis to generate the second recording block.

12. The method as claimed in claim 9, further comprising:

modulating the first recording block; and

recording the modulated recording block on the optical disc.

13. The method as claimed in claim 9, wherein the dividing of the ECC blocks includes:

dividing each of the ECC blocks in the column direction by a predetermined number of bytes to generate object blocks; and

dividing each of the object blocks in the row and column directions by the predetermined number of bytes to generate the plurality of partitions, wherein the interleaving of the data comprises interleaving all of the data using a same algorithm.

14. The method as claimed in claim 9, wherein the interleaving of the data comprises interleaving all of the data using a same algorithm.

15. The method as claimed in claim 10, wherein the partitions each comprise a predetermined number of bytes of the data.

16. The method as claimed in claim 10, wherein the dividing of the ECC blocks includes:

obtaining a common divisor d for N1 and N2, wherein a size of the ECC blocks is N1xN2 bytes;

dividing each of the ECC blocks by a unit of d bytes in the column direction to generate N2/d object blocks; and

dividing each of the object blocks into d portions in the column and row directions to

generate d x d of the partitions.

17. The method as claimed in claim 16, wherein the generating of the first recording block comprises interleaving the data of the partitions such that 2 x N2 row-code words are included in the first recording block.

18. The method as claimed in claim 16, wherein the ECC blocks have row-code words (N1, k1), and column-code words (N2, k2), and the first recording block includes a main data region of 2 x (N2-k2) bytes and an outer parity region of 2 x k2 bytes.

19. An apparatus to record data on an optical disc, the apparatus comprising:

an error correction code (ECC) encoder to generate a plurality of ECC blocks on which the data is recorded; and

an interleaver, comprising:

a partitioning portion to divide each of the ECC blocks into a first unit in a row direction and a second unit in a column direction to generate a plurality of partitions,

a data extracting portion to alternately extract data from the partitions, and

a recording block generating portion to interleave the extracted data and generate a recording block.

20. The apparatus as claimed in claim 19, further comprising:

a modulating part to modulate the generated recording block; and

a recording part to record the modulated recording block on the optical disc.

21. The apparatus as claimed in claim 20, wherein the partitioning portion divides each of the ECC blocks in the column direction by a predetermined number of bytes and divides

each of the ECC blocks in the row direction by the predetermined number of bytes to generate the plurality of partitions.

22. The apparatus as claimed in claim 20, wherein the recording block generating portion sequentially interleaves the extracted data to generate the recording block.

23. The apparatus as claimed in claim 20, wherein the partitioning portion obtains a common divisor d for N1 and N2, wherein a size of the ECC blocks is N1xN2 bytes, and divides each of the ECC blocks by d bytes in the column direction to generate a plurality of object blocks, and divides each of the object blocks into d portions in the column and row directions to generate d x d partitions.

24. An apparatus to record data on an optical disc, the apparatus comprising:

an error correction code (ECC) encoder to generate two ECC blocks; and

an interleaver to divide each of the two ECC blocks by a first unit in a row direction and by a second unit in a column direction to generate a plurality of partitions, and to alternately extract data from the partitions, and to interleave the extracted data and thereby generate a recording block.

25. The apparatus as claimed in claim 24, further comprising:

a modulating part to modulate the recording block; and

a recording part to record the modulated recording block on the optical disc.

26. The apparatus as claimed in claim 25, wherein the interleaver divides each of the ECC blocks in the column direction by a predetermined number of bytes to generate a plurality of object blocks, and divides each of the object blocks in the column and row directions by the

predetermined number of bytes to generate the plurality of partitions.

27. The apparatus as claimed in claim 24, wherein the interleaver obtains a common divisor d for N1 and N2, wherein a size of the ECC blocks is N1xN2 bytes, and divides each of the ECC blocks by d bytes in the column direction to generate a plurality of object blocks, and divides each of the object blocks into d portions in the column and row directions to generate d x d of the partitions.

28. The apparatus as claimed in claim 27, wherein the interleaver interleaves 2 x N2 row-code words (N1, k1) into the recording block.

29. The apparatus as claimed in claim 28, wherein:

the ECC encoder generates the ECC blocks having the row-code words (N1, k1), and column-code words (N2, k2); and

the interleaver converts a block including the 2 x N2 row-code words to generate the recording block, which includes a main data region of 2 x (N2-k2) bytes and an outer parity region of 2 x k2 bytes.

30. An optical recording medium comprising main data included in a recording block, data from partitions of a plurality of error correction code (ECC) blocks being interleaved in the recording block.

31. The optical recording medium as claimed in claim 30, wherein the data from the partitions is interleaved so that each of the ECC blocks is alternately and equally selected.

32. A method of recording/reproducing data comprising:

generating a plurality of error correction code (ECC) blocks, the ECC blocks comprising the data;

dividing each of the ECC blocks into a plurality of partitions; and

interleaving the data from the partitions, comprising alternately selecting the partitions of each of the ECC blocks.

33. The method as claimed in claim 32, wherein the interleaving of the data further comprises selecting an equal amount of the data from the partitions of each of the ECC blocks.

34. The method as claimed in claim 32, further comprising encoding the data in the ECC blocks.

35. The method as claimed in claim 32, wherein the interleaving of the data generates a recording block.

36. The method as claimed in claim 32, wherein the dividing of the ECC blocks comprises dividing each of the ECC blocks into object blocks.

37. The method as claimed in claim 36, wherein the dividing of the ECC blocks further comprises dividing the object blocks into the partitions.

38. The method as claimed in claim 37, wherein a size of the ECC blocks is N1xN2 bytes, d is a common divisor of N1 and N2, and the dividing of the ECC blocks into the object blocks comprises dividing the ECC blocks by d byes in a first direction.

39. The method as claimed in claim 38, wherein the dividing of the object blocks into

the partitions comprises dividing the object blocks into d portions in the first and a second direction.

40. The method as claimed in claim 35, further comprising:

modulating the recording block;

recording the modulated recording block on a medium;

reading the modulated recording block from the medium;

demodulating the modulated recording block; and

deinterleaving the demodulated recording block.

41. The method as claimed in claim 1, wherein a burst error is corrected.

42. The method as claimed in claim 17, wherein the second recording block comprises sectors, and the row-code words comprise an identifier ID in each of the sectors.

43. The method as claimed in claim 42, wherein the row-code words are obtained by Reed-Solomon Product coding.

44. The method as claimed in claim 9, wherein the first recording block comprises an outer parity region and a main data region.

45. The method as claimed in claim 18, wherein 2 x k2/32 rows of the data are extracted from the outer parity region to form a sector of the second recording block.

46. A method of reproducing data from a medium, the data comprising a recording

block, the recording block generated by alternately interleaving the data from a plurality of partitions generated by dividing a plurality of error correction code (ECC) blocks, the method comprising:

reading the recording block from the medium; and

deinterleaving the read recording block.

47. An apparatus to reproduce data from a medium, the data comprising a recording block, the recording block generated by alternately interleaving the data from a plurality of partitions generated by dividing a plurality of error correction code (ECC) blocks, the apparatus comprising:

a reader to read the recording block from the medium; and

a deinterleaver to deinterleave the read recording block.